

WatchTime

THE WORLD OF FINE WATCHES

E-SPECIAL

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TAG HEUER TRIPLE FEATURE

- MONACO CALIBRE 11
EDITION STEVE MCQUEEN
- CARRERA 1887
CHRONOGRAPH
- MONACO V4



3 ARTICLES FROM THE PAGES OF WATCHTIME

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TAG Heuer Special Tablet Reprint, December 2013



This special tablet reprint contains a trio of articles reviewing three TAG Heuer watches. In them, our WatchTime testers report on their experiences wearing and using the watches and evaluate them for ease of use, comfort, legibility and looks. The articles also provide the results of the watches' timing tests, performed on a timing machine and on the wrist. For each watch, the articles give a bullet-point list of "pros" and "cons" summarizing the tester's findings. All three articles were published in WatchTime magazine and have been reproduced as they originally appeared.

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BY ALEXANDER KRUPP

PHOTOS BY OK-PHOTOGRAPHY

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(From the April 2011 issue of WatchTime)



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BY JENS KOCH

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(From the October 2010 issue of WatchTime)

ON THE COVER: From left, TAG Heuer's Monaco Calibre 11 Edition Steve McQueen, Carrera 1887 Chronograph, and Monaco V4.

WatchTime

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TRACK SUITED

The Monaco Calibre 11 Edition Steve McQueen, an updated version of the watch McQueen wore in the movie “Le Mans,” has racing written all over it. Did it take the checkered flag in our test?

BY ALEXANDER KRUPP

PHOTOS BY OK-PHOTOGRAPHY

Pros

- + Attractive styling
- + Good craftsmanship
- + Comfortable to wear

Cons

- Poor legibility
- Greatest deviation of rate too high



More than four decades have passed since Steve McQueen wore a Heuer Monaco chronograph in the car-racing movie “Le Mans.” Two years ago, TAG Heuer (the company added “TAG” to its name in 1985) launched a commemorative edition of the watch called the Monaco Calibre 11 Edition Steve McQueen. We took it out for a test drive.

The watch’s styling evokes its racing heritage. It has racing stripes on its dial – along with a logo that reads simply “Heuer” in homage to its pre-TAG origin – and a perforated strap. The watch is big – 39 mm by 39 mm and 15 mm thick – but it’s very comfortable. Nothing scratches, pinches, or rubs. The clasp and supple calfskin strap both feel pleasant on the wrist.

The movement is a Sellita SW 300 base, with Glucydur balance, paired with a chronograph module made specifically for TAG by Dubois Dépraz. (Most other Monaco chronographs contain the ETA 2894.) The movement’s configuration enables TAG to place the crown on the left side of the case while keeping the chronograph pushers on the right, the same arrangement that was used in the original Monaco. (That watch, launched in 1969, was one of the world’s first automatic chronographs. It contained a caliber developed by Breitling, Büren and Dubois Dépraz, and, like the caliber in our tested watch, was numbered

SPECS

TAG HEUER MONACO CALIBRE 11 EDITION STEVE MCQUEEN

Manufacturer: TAG Heuer SA, Rue Louis-Joseph Chevrolet 6a, CH-2300 La Chaux-de-Fonds, Switzerland

Reference number: CAW211D.FC6300

Functions: Hours, minutes, small seconds, 30-minute chronograph with counter, date display, stop-seconds function

Movement: Sellita SW 300 “premium”-grade with Dubois Dépraz module DD 2006 exclusive to TAG Heuer, automatic, 28,800 vph, 55 jewels, index regulation with eccentric screw, Incabloc shock absorption, cam switching, vertical coupling, Glucydur balance, 42-hour power reserve; diameter = 30.4 mm, height = 9.6 mm

Case: Stainless steel with domed sapphire crystal, four screws hold caseback in place, sapphire window in caseback; water resistant to 100 meters

Strap and clasp: Hand-sewn cut calfskin strap with folding clasp made of stainless steel

Rate results:

(Deviations in seconds per 24 hours)

With chronograph switched off/on

Dial up +5 / +5

Dial down +6 / +5

Crown up -2 / -2

Crown down +8 / +8

Crown left +6 / +5

Crown right -3 / -4

Greatest deviation of rate 11 / 12

Average deviation +3.3 / +2.8

Average amplitude:

Flat positions 294° / 290°

Hanging positions 271° / 260°

Dimensions: 39 mm x 39 mm; thickness = 15 mm; weight = 124 g

Price: \$8,100



The movement, Calibre 11, is based on the Sellita SW 300.

TEST

TAG Heuer Monaco Calibre 11 Edition Steve McQueen

*The watch bears the old
"Heuer" logo, which
was used when the
Monaco first came out.*



AS IN THE
ORIGINAL, THE
CHRONO PUSHERS
ARE ON THE RIGHT
AND THE CROWN
ON THE LEFT.

“11.”) It is accomplished by turning the base movement by 180 degrees and then installing the chronograph module in the opposite direction so the push buttons are in their usual position.

Having the crown on the left gives the watch historical accuracy and an unusual look to boot, but does it offer any practical advantages? One benefit is clear: assuming you are wearing the watch on your left hand, the crown won’t dig into the back of your hand when you bend your wrist sharply, to do a few push-ups, for example. Unfortunately, the disadvantages outweigh this plus. First, a right-handed wearer must take the watch off before he can wind or set it because he’ll find it cumbersome or impossible to operate the crown with his right hand. Second, after he takes the watch off, he’ll have to do the winding or setting with his left hand, and not every right-handed wearer will find this easy. Third, the directions for winding and setting are reversed, i.e., you not only have to use the “wrong” hand, you also have to move your fingers in the opposite direction to the one you’re accustomed to.

The watch has another operation-related problem: the stop-start chronograph button is too easy to push in. A smoothly running button is generally a desirable feature, but the one on our test watch yielded to pressure so readily that contact with the tightly fitting sleeve of the wearer’s jacket was enough to stop the chronograph prematurely.

These shortcomings are balanced out by several virtues. The crown is large and easy to grasp; the chronograph pushers are also big enough to operate easily; and the movement has both a stop-seconds function and, for the date display, a rapid-reset mechanism. The clasp, made of stainless steel, is sturdy, well-crafted and user-friendly. You open it by pushing two large buttons. It snaps firmly shut afterwards. The strap can be extended – continuously, not by increments – via a clamping mechanism that holds the strap securely in the chosen position.

The clasp is designed so that more leather than metal is in contact with your wrist, thus enhancing wearing comfort. In terms of quality, the strap, laboriously hand-sewn, is on a par with the clasp. If you want to change the strap or remove it to clean the side of the case between the lugs, you’ll be pleased to



A clamping mechanism lets you adjust the strap to any length.

find little slides on the lugs. No tools are required: a bit of force is all that’s needed to move these slides.

The crystal and case are also well-crafted. The former, which is cambered and has elaborate faceting along its edges, is made of sapphire even though this material is notoriously difficult to work with. (Until 2009, TAG Heuer used Plexiglas.) The longitudinal curve of the crystal conforms to the curve of the case, which rises higher between the lugs than at the left and right sides. This complex shape is costly to achieve compared with an ordinary inset crystal.

The case has many chamfers and edges. The borders between polished and satin-finished surfaces are very precise. The chrono pushers are highly detailed and distinctively shaped. They are set in bushings that protect them from impacts and give them greater hold, thus minimizing wiggling. The caseback has a round sapphire window and is held in place by screws. There are only four of them, standard for a square or rectangular watch, but they are thick and sturdy.

If there were anything to complain about with respect to the case, it perhaps would be the small size of the caseback window. Although there is no compelling technical reason for it, this window is smaller than the movement. The edges of the movement and of the oscillating weight thus remain hidden.

Beneath the window, we were nonetheless pleased to discover that TAG Heuer uses the high-quality “premium” version of the SW 300. This quality grade is comparable to the “top” grade of the ETA 2892, which has precision worthy of a COSC certificate but is not sent to COSC to be tested. (The SW 300 has the same specs as the ETA 2892; it was designed to be used as an alternative to that movement.)



The case and crystal are complex in shape but very well made.

The chronograph module, which is on the dial side of the movement and hence concealed, relies on the simple but effective cam method of switching, which we're familiar with from ETA's workhorse 7750. The chronograph works via vertical coupling, which prevents spasmodic jumping of the chronograph seconds hand when the stopwatch function starts.

The watch's running behavior was basically good. On the wrist and on the timing machine, with and without the chronograph running, the average daily gain was about three seconds. The amplitude scarcely declined when the chronograph was switched on, which leads us to conclude that all the working surfaces in the chronograph module are well crafted. We discovered a maximum difference of 11 seconds among the various positions in ordinary operation and 12 seconds with the chronograph switched on. That's why the watch earned only six points in the "rate results" category. The low daily gain and stable amplitude would otherwise have earned the watch a perfect 10.

The dial's legibility is also a drawback. The easiest display to read is the minutes counter at 9 o'clock (its hand runs continually rather than jumping forward once a minute). The main dial achieves its very successful retro and auto-racing look by eliminating numerals to mark the hours and minutes, but this makes the watch harder to read. Furthermore, the contrast between the luminous areas on the center-mounted hands and the mostly pale dial is very weak. The luminous material is applied sparingly and glows only dimly in the dark. And the running seconds subdial is confusing because it has so many markers.

Poor legibility won't dissuade fans of mechanical timekeeping who have taken a shine to this smartly styled watch. The watch's price, \$8,100, is high, but not too high given the watch's expensive movement, its high quality and its good looks. ○

SCORES

TAG HEUER MONACO CALIBRE 11 EDITION STEVE MCQUEEN

Strap and clasp (max. 10 points):

The perfectly crafted calfskin strap is equipped with a quick-change system and a terrific clasp. **10**

Operation (5): Two real disadvantages are the placement of the crown on the left and the too easily triggered start-stop button. Setting the watch is facilitated by a rapid-reset function for the date and by a stop-seconds function. **3**

Case (10): The case is complex and perfectly finished, but the window in the caseback is rather small. **9**

Design (15): Very attractive retro styling with crown on the left, which is faithful to the original Monaco design. **14**

Legibility (5): The hands are the right length and the scale on the elapsed-minutes counter is clearly calibrated, but the main dial offers little contrast and has neither hour nor minutes numerals, the seconds subdial is cluttered and the luminosity is mediocre. **2**

Wearing comfort (10): Given its size, this watch is much more comfortable than one would expect, thanks to its supple strap, well-designed clasp and moderate weight. **9**

Movement (20): This modular chronograph based on a caliber manufactured in large series doesn't embody the utmost in haute horlogerie, but the movement is worthy of respect thanks to its Glucydur balance, vertical coupling and well-crafted moving parts. **14**

Rate results (10): The daily deviation of rate is small and the amplitude is stable, but the greatest deviation was high. **6**

Overall value (15): The price is acceptable for this very well-crafted and attractive watch. **11**

TOTAL: 78 POINTS

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Pros

- + Pushers are easy to operate
- + Good rate results
- + Beautiful movement

Cons

- Limited legibility



The latest version of TAG Heuer's racing-inspired Carrera has a brand-new movement. We take the Carrera 1887 Chronograph for a spin.

BY JENS KOCH
PHOTOS BY NIK SCHÖLZEL

SPEED
NINJA

TAG Heuer celebrated its 150th anniversary in 2010. Its most important model, the Carrera chronograph, was introduced less than 50 years ago, in 1964, but has become a recognized classic. The watch is the brainchild of Jack W. Heuer, then managing director at Heuer (which became TAG Heuer after it changed hands in 1985), who designed a simple dial and then used the tension ring that presses the Plexiglas against the case from the inside as a design element by printing on it the graduations for the chronograph.

Thus, a classic watch with excellent legibility was born. Heuer, a fan of automobile racing, named the watch after the Carrera Panamericana, or “Pan Am,” of the 1950s. The Pan Am was a challenging road race through Mexico over 3,000 kilometers of the newly finished Mexican section of the Pan American Highway. (Porsche’s Carrera cars are also named for this race.)

The Carrera watch was initially equipped with the manually wound Venus Caliber 72 but this was later replaced by the now-famous Caliber 11, developed by Heuer in 1969, in collaboration with Breitling, Büren and Dubois Dépraz, as one of the first automatic chronograph movements. In the 1970s, the design of the Carrera underwent a series of changes until the quartz crisis caused the model to fall by the wayside.

Since its re-introduction in 1996, the Carrera has become TAG Heuer’s most successful model. The first watches were very similar to the original, but in 2004 their design was updated with a wide, black tachymeter track. In 2008, a new line extension, called Grand Carrera, was added.

The newest Carrera has returned to a simpler form. Its designers have omitted the tachymeter track and placed the seconds markers on the inner flange, where they were on the original Carrera. The hands, markers and understated ripple pattern on the chronograph counters also recall the original. The silver rings for the minute and hour counters, first seen on the black-dialed 2002 model, have become a characteristic feature of the Carrera. One change: the date is now placed within the hour counter at 6 o’clock. The design is not as distinctive as one would like for a watch of this status; it probably won’t turn heads from far away. The small-seconds subdial at 9 o’clock has four cross-hair markers with the horizontal lines replaced by the words, “Cal. 1887.”

TAG Heuer has accomplished a great deal with this exclusive movement, which has an interesting back-story. The brand obtained the rights to a complete and finished movement from Seiko and now produces it with a few minor technical changes and several design modifications. (TAG Heuer’s initial claim that it was a *manufacture* movement initially drew some criticism from watch industry insiders.)

SPECS

TAG HEUER CARRERA 1887 CHRONOGRAPH

Manufacturer: TAG Heuer, Rue L.-J.-Chevrolet 6a, CH-2300 La Chaux-de-Fonds, Switzerland

Reference number: CAR2110

Functions: Hours, minutes, seconds, date, chronograph with 12-hour, 30-minute and seconds counters

Movement: Caliber 1887, automatic; 28,800 vph; 39 jewels; Glucydur balance; fine regulator with eccentric; 50-hour power reserve; diameter = 29.3 mm; height = 7.13 mm

Case: Stainless steel, curved sapphire crystal with double-sided nonreflective coating, fully threaded caseback with sapphire crystal, water-resistant to 100 meters

Bracelet and clasp: Stainless steel with stainless-steel safety folding clasp

Rate results:

(deviation in seconds per 24 hours, without/with chronograph switched on)

Dial up	+4	+4
Dial down	+4	+4
Crown up	+1	0
Crown down	+2	+3
Crown left	-1	-4
Crown right	+2	+4
Greatest deviation:	5	8
Average deviation:	+2	+1.8
Average amplitude:		
flat positions	313°	284°
hanging positions	279°	250°

Dimensions: Diameter = 41 mm, height = 15.7 mm, weight = 160 grams

Variations: With brown dial and brown crocodile strap (\$4,800)

Price: \$4,300



*Caliber 1887,
with column
wheel and TAG
Heuer rocking
pinion*

CALIBER 1887 is based on Seiko's Caliber 6S78, introduced in 1998, which has been used mostly in the Japanese company's high-end Credor mechanical watches, available only in Japan.

When TAG Heuer set out to develop its own chronograph movement, it determined that this Seiko movement met many of its requirements: it is thinner than the Valjoux 7750, has a column wheel and, most importantly, uses a rocking pinion. This type of chronograph clutch is an excellent fit for TAG Heuer, since it was company founder Edouard Heuer who invented and patented it in 1887 (hence, the caliber's name).

TAG Heuer and Seiko came to an agreement that the Swiss brand would be permitted to use the movement design, which allowed TAG Heuer to bypass at least two years' worth of development work, even though the movement still had to be reworked for mass production in order to meet the brand's goal of making 50,000 pieces annually.

From a design point of view, TAG Heuer left most things unchanged, though it added a few new details, like an eccentric setting screw for adjusting the rocking pinion. The entire escapement, with its balance, hairspring fine regulator and shock ab-

sorber, was replaced with components from Swiss manufacturers. Even the shapes of the mainplate, bridges and rotor were changed. TAG Heuer manufactures these parts in the town of Cornol at its subsidiary, Cortech. Milling machines from another company, Fleury, use a rather uncommon process to dry-machine brass parts like mainplates and bridges. The omission of oil as a coolant in the process means that the parts do not need to be cleaned between the various processing stages, thus saving time. Cortech uses a robot that places the 39 jewels in the mainplate and bridges. Final assembly takes place in a new TAG Heuer facility in La Chaux-de-Fonds on a semi-automatic assembly line with both manual and fully automated stations. Seiko is the only non-Swiss company among the 22 suppliers of parts for the movement. Seiko also supplies stamped parts, which it makes sure meet the Swiss standards for the "Swiss made" designation.

Another aspect of the Seiko movement that TAG found advantageous was its reliable, quick automatic winding. This is due to Seiko's "Magic Lever" system, or double pawl, where the pawl lever is attached eccentrically to a wheel. One pawl pulls

TEST

TAG Heuer Carrera 1887 Chronograph

The safety folding clasp is practical, sturdy and easy to use.

and the other pawl pushes the winding gear. This winding mechanism is said to be 30 percent more efficient than a conventional automatic winding system.

THE MOVEMENT'S highly visible column wheel, blued in-house by TAG Heuer, is another highlight. It ensures an extremely smooth-operating start-stop pusher, as in the old Venus column-wheel movements. Plus, the reset pusher requires relatively little pressure.

The rocking pinion was also important. This chronograph clutch, developed by Heuer, has a shaft, or pinion, with a toothed gear at the top and bottom for starting and stopping the chrono seconds hand. While the lower gear is always engaged with the second wheel (which means that the shaft is always turning), the upper gear is engaged with the chrono-runner only when a lever starts the chronograph. This rocking pinion simplifies the chronograph clutch and has proven to be very reliable. A traditional, horizontal clutch is viewed as more elegant, and a modern vertical clutch as technically superior, with the lowest initial jump of the chrono seconds hand during start-up. Still, the rocking pinion in the Caliber 1887 is intended to ensure a quicker start to the chronograph thanks to a larger upper gear with more teeth and a modified tooth profile.

The watch's hack mechanism and quick-date adjuster make it easy to synchronize the seconds hand with a radio-controlled clock and to set the date quickly. The push-in crown is easy to pull and turn. It takes slightly more than an hour for the date to advance; the process begins just before 11 o'clock and ends just before 12 o'clock.

THE MOVEMENT consists of 320 parts and is nicely decorated. The view through the crystal caseback shows Geneva stripes and perlage on the bridges and rotor, polished



The slanted bezel camouflages the thickness of the case.





*Carrera models from
(l-r) 2010 (earlier ver-
sion of the 1887 with
tachymeter bezel),
2004, 2002 and 1964*

screws, and the multi-part rotor with its T-shaped inner section and curved oscillating weight. Only under a loupe can one see processing marks on some polished surfaces. All in all, however, the movement is much more attractive than the Valjoux 7750.

The rate results are also easy on the eye. On the wrist the watch showed only a slight gain of 0.5 seconds per day. On the timing machine — a Witschi Chronoscope X1 — it showed an average gain of two seconds per day. The greatest deviation between the various positions was only five seconds, a good value. When the chronograph was engaged, the variation averaged only +1.8 seconds per day. The greatest deviation between the positions was somewhat high, at eight seconds. The drop in amplitude from horizontal to vertical positions was the same whether the chrono was running or not: 34 degrees.

Good rate results are important, but so is good legibility. The new Carrera 1887, unfortunately, is not as well designed in this area as its historical predecessor. Because the hands are exactly as wide as the rings around the subdials and also the same silver color, you need to look carefully to read the time. In the dark, the small amount of luminous material also makes it difficult. Although the hands are easy to discern, the dots of luminous material on the markers are hard to find and the 12 o'clock marker does not stand out in any way. Reading the elapsed time on the chronograph is simpler. Though not visible at night, the silver hands against the black dial are easy to see during the day. The minute hand does not run continuously but jumps ahead every minute.

The large dial and crystal increase legibility. They make the case, at 41 mm in diameter, seem even larger than it is. In contrast, its height is an impressive 16 mm, but the extended lugs and the slanted edge on the caseback and curved bezel camouflage the height very well. Both pushers and the standard, unthreaded crown are sturdy and do not have a lot of play within the case.

The clasp is also very sturdy, as well as solid and easy to open with the two deployant buttons. Unlike a double-folding clasp,

TAG HEUER'S CALIBER 1887 HAS A COLUMN-WHEEL CONTROL FOR SMOOTHLY OPERATING PUSHERS, A RELIABLE ROCKING-PINION CLUTCH AND EFFICIENT PAWL WINDING MECHANISM.

SCORES

TAG HEUER CARRERA 1887 CHRONOGRAPH

Bracelet and clasp (max. 10 points): Good finishing. The steel bracelet is rather simple but the clasp is superb. **7**

Operation (5): The pushers and crown are very easy to operate and the hack mechanism and quick date adjuster make setting the watch simple. **5**

Case (10): Nicely finished and polished with sturdy pushers and crown **8**

Design (15): This attractive watch's dial could have been given a more distinctive design. **12**

Legibility (5): Not easily legible: confusing subdial rings and insufficient luminous material. **3**

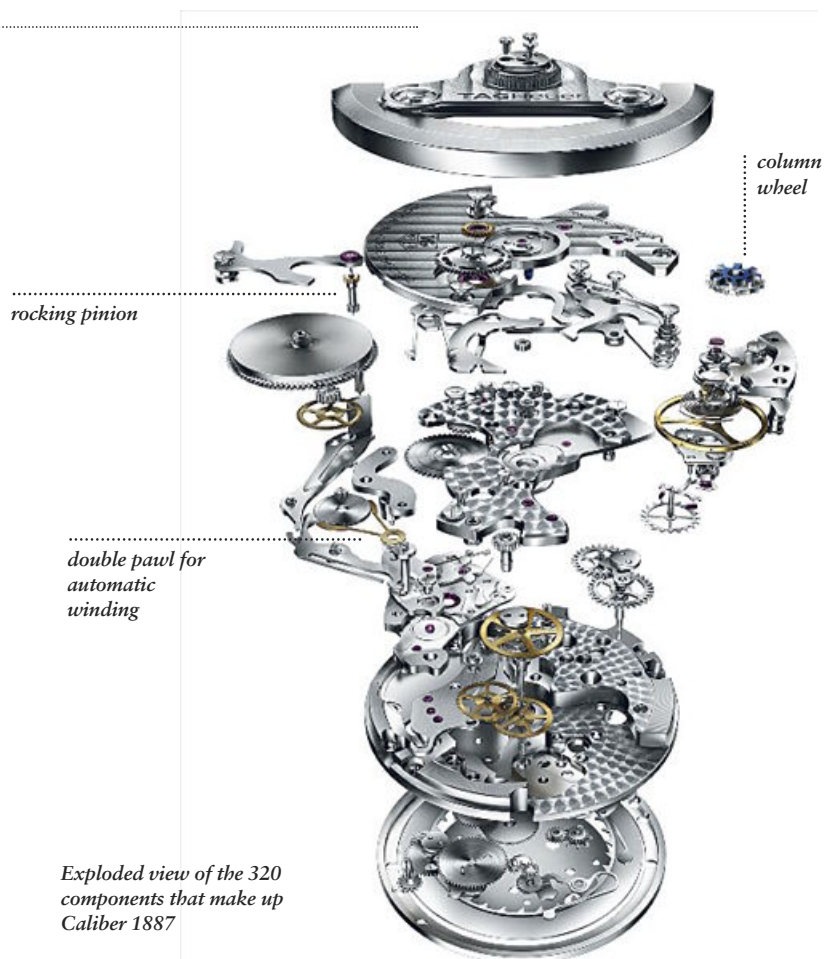
Wearing comfort (10): Comfortable to wear, though the bracelet pulls fine hairs on the wrist. **8**

Movement (20): The well-designed chronograph movement with column wheel and quick pawl winding mechanism has appealing decorations. **16**

Rate results (10): The rate shows minimal gain and the greatest deviation between different positions is quite small. **8**

Overall value (15): The price is reasonable for a watch with these attributes. **13**

TOTAL: 80 POINTS



this one has only one hinge, which makes it easier to close. Although the clasp may not be particularly striking in its design, it is still quite nicely finished. The bracelet is also well finished but is attached with simple pins rather than screws. The five-part links have alternating satin and polished surfaces, a pattern that is not echoed on the case. And, unfortunately, the bracelet tends to pull the fine hairs on the wrist. Otherwise, wearing comfort is fine, and the few sharp edges on the bracelet and case are not problematic.


The Carrera 1887 Chronograph costs \$4,300 on a steel bracelet. This is appropriate for the quality it offers, and, for a watch containing an exclusive chronograph movement with a column wheel, could even be considered a bargain. Overall, fitting this racing-inspired watch with a new engine has been a successful endeavor.

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Pros

- + Spectacular appearance
- + Innovative technology
- + Mechanisms are visible from the front

Cons

- Sharp-edged case
- High rate deviation
- Difficult to read time with to-the-second accuracy

Belt Titan

WatchTime gets under the hood of the belt-driven Monaco V4, the first serially produced version of TAG Heuer's 2004 concept watch.

BY JENS KOCH

The four barrels are tipped at an angle of 13°; the rotor moves linearly; three sapphire crystals offer clear views of the movement.



The Italian term “*bella macchina*,” or “beautiful machine,” is most often used to describe a well-designed, well-engineered sportscar, but it also applies to TAG Heuer’s Monaco V4 watch. The automotive comparison is apt, because the V4 is firmly rooted in the world of well-tuned motors. The “4” in its name refers to the number of “cylinders,” or barrels. The “V” alludes to the

styling: as in an automobile’s V-engine, the barrels of the V4 are V-shaped and positioned to form a 26° angle toward each other. The watch’s most interesting technical aspect — its system of transferring power via drive belts — is directly influenced by automotive technology. And, of course, the Monaco model series has been linked to auto racing since its debut in 1969. It was named for the Monaco Grand Prix and Steve McQueen famously wore one in his 1971 racing film, *Le Mans*.

The three drive belts are visible from the front of the watch, as are the balance, several V-shaped bridges and the two wheels of the barrels, which are tipped at a 13° angle. The watch’s back is also unusual. There, the winding bar moves up and down, and the tipped barrels, with their drive belts, are visible to the right and left of the sliding bar.

THE DRIVE BELTS
ARE THINNER
THAN HUMAN
HAIRS, THE
THINNEST SUCH
BELTS EVER USED
IN ANY INDUSTRY.

When TAG Heuer introduced the Monaco V4 as a concept watch six years ago, many wondered whether it could ever be developed into a fully functional and serially produced wristwatch, but the company accomplished this feat in 2010, its 150th year. It will produce a series of 150 pieces in honor of the anniversary. However, not all of the features that were incorporated into the concept watch could be transferred to the serially manufactured model. The tipped barrels and linear winding weight were preserved, but only five of the original 13 planned drive belts could be integrated into this new watch, and the belts are much thinner than they were on the original. Thirty-nine ball bearings were planned, but only 11 survive. And the engineers were unable to dispense entirely with ruby bearings and conventional gears, as they had originally intended.

Nevertheless, the Monaco V4 represents a unique technological accomplishment. The biggest hurdle was creating a power system based on drive belts, something that had never before been achieved in a wristwatch. A specialist had to be found who could manufacture the belts in the needed minuscule dimensions, thinner than had ever been used before in any industry. The three belts in the gear train are only 0.25 mm wide and 0.07 mm thick, which means that each one is thinner than a human hair.

The two belts for the barrels are about twice as wide and twice as thick, which enables them to pull 10 times more weight, up to 1.3 kilograms. All of the belts are made of an artificial material known as PEBA (polyether block amide), a thermoplastic elastomer sometimes used as a shock absorber in high-quality running shoes and basketball shoes, and also occasionally for the outer casing of electrical cables.

The primary advantages of using drive belts for the propulsion system are twofold: they require no maintenance and they convey force via a positive connection; that is, there's no play between the teeth of the gears as there is in a conventional, gear-driven system. Furthermore, drive belts need no lubrication. Their high degree of efficiency (96 percent) is only slightly less than that achieved by a well-lubricated gear-to-pinion connection (99 percent). Furthermore, a drive belt's efficiency doesn't decline over time, unlike that of a gear-based system, whose efficiency wanes to 93 percent when lubrication begins wearing away.

ANOTHER SPECIAL feature: when two gears are connected by a drive belt, both wheels always turn in the same direction; two gears that directly mesh with one another must rotate in opposite directions. Since the balance of the Monaco V4 is reversed,

SPECS

TAG HEUER MONACO V4

Manufacturer: TAG Heuer, Rue L.-J. Chevrolet 6A, CH-2300 La Chaux-de-Fonds, Switzerland

Reference number: WAW2170.FC6261

Functions: Hours, minutes, seconds

Movement: Automatic, 28,800 vph, 48 jewels, Kif shock absorption, Glucydur balance, fine adjustment via index tail and eccentric screw, dimensions = 35 mm x 31.5 mm, height = 9.45 mm, 52-hour power reserve

Case: Platinum, sapphire crystal is non-reflective on both surfaces, caseback held in place by four screws, sapphire window in caseback, water-resistant to 50 meters

Strap and clasp: Crocodile-skin strap, platinum folding clasp

Rate results:

(Deviations in seconds per 24 hours)

Dial up +16

Dial down +19

Crown up +14

Crown down +22

Crown left +24

Crown right +11

Greatest deviation of rate: 13

Average deviation: +17.7

Average amplitude:

Flat positions 272°

Hanging positions 266°

Price: \$80,000 (limited edition of 150 pieces)

The drive belts are easily visible from the front.



SCORES

TAG HEUER MONACO V4

Strap and clasp (max. 10 points): The hand-sewn crocodile strap and the beautiful, practical, platinum folding clasp with safety buttons are very well crafted. **9**

Operation (5): The crown is easy to pull out, extracts to one position only and turns easily, but the movement unfortunately lacks a stop-seconds function. **4**

Case (10): Attention to detail is evident in the elaborately crafted platinum case: for example, the facets of the crystal above the dial transition smoothly into the case. **8**

Design (15): The V4 is consistent and harmonious. Skeletonized bridges accentuate the high-tech design with the V motif that lends the watch its name. **14**

Legibility (5): The hands contrast well with the movement. Indices are only sporadically placed, and luminous material is applied only to the hands. **3**

Wearing comfort (10): The sharp edges and the three raised windows on the back are uncomfortable, and this heavy watch doesn't lie flat against the wrist; however, the adjustable strap is a plus. **6**

Movement (20): Except for the fine adjustment, this is a very high-quality *manufacture* caliber with a unique drive-belt power system, a linear oscillating weight and barrels positioned at an angle. **17**

Rate results (10): The movement has been adjusted to gain too much. The greatest deviation among the various positions is also too high. **5**

Overall value (15) The enormous cost of developmental work is reflected in the high price. Then again, there is no comparable watch. **12**

TOTAL: 78 POINTS

its escape wheel already rotates clockwise, so no additional gear is needed to reverse the direction of rotation. However, to prevent the drive belts from slipping, the pinions for the drive belts had to be larger than the pinions in a conventional gear-to-pinion connection. On the other hand, space-related problems impose limits on the sizes of gears, so a drive-belt system needs twice as many gears as a conventional, gear-driven movement to accomplish the extreme reduction from the speedy oscillations of the escape wheel, through the fourth wheel, to the slow turning of the minute wheel. Although a greater number of gears is required, the individual gears can be located wherever is convenient, because there's no functional limit to the length of a drive belt.

Compared to drive-belt propulsion, which even the CAD construction programs used in the world of watchmaking cannot simulate, developing the 13°-tipped barrels and the linear winding was relatively simple. The winding weight weighs 12 grams and is made of tungsten, a rather heavy metal. This weight moves up and down along a track and is kept at its proper distance by a gear that meshes with its toothed underside. It winds the two pairs of barrels via two lateral, toothed racks, which are also tipped at a 13° angle. Power from the four barrels is brought together on the front at 12 o'clock: an ordinary toothed connection wouldn't work with these tipped wheels, so the two 13°-tipped racks mesh with a conical gear that bears teeth cut at the correct angle.

TAG Heuer purchases the drive belts from a specialized supplier, but it makes the lion's share of the movement's other components itself. Each Monaco V4 watch is assembled by master watchmaker Denis Badin in La Chaux-de-Fonds, Switzerland. As with all of TAG Heuer's watches, this one must pass in-house tests, which include a vibration test and a fall from a height of one meter. The watch must also continue to function properly at temperatures ranging from a frigid -10° C (14° F) to a scorching +60° C (140° F).

THIS WATCH'S exciting engine is matched by its high-tech design, with V-shaped bridges and a cleverly styled case boasting a curved, laterally faceted, sapphire crystal. The broad, thermally blued hands contrast well with the movement's silver-colored components. However, the four applied indices, arranged somewhat haphazardly, provide only approximate orientation for reading the time, as does the only vaguely discernible minute circle. The hands glow in the dark, but the indices are not luminescent, which also detracts from the watch's ability to accurately display the time. On the other hand, operating the Monaco V4 presents no challenges: its crown is easy to grip, turn and pull out. There's only one extracted position, for setting the hands; unfortunately, the watch continues to run while you do so, which makes it more difficult to set it with to-the-second precision.

The platinum case, which TAG Heuer manufactures in its other Swiss workshop in Cornol, is cleverly designed and very cleanly processed: the curved sapphire crystal above the dial has two clearly visible facets that neatly transition into the flanks of

In the absence of a dial, the broad blue hands contrast well against the skeletonized movement.

the case, which offers an attractive contrast between its polished and satin-finished surfaces. The three sapphire windows on the back show great attention to detail, but the lower corners of the case are simply too sharp. Sooner or later, they're sure to tear shirt cuffs and could even injure the watch's wearer. In other areas, too, the watch's case is uncomfortable to wear: the angled and slightly protruding windows on its back allow the watch to wiggle back and forth, and they have a tendency to press into the back of the wearer's wrist.

By contrast, the supple, hand-sewn, crocodile-skin strap wraps closely and comfortably around the wrist. The strap can be securely closed and easily reopened with the practical folding clasp, which is made of platinum. This clasp's clamping system allows the user to adjust the strap to any desired length, and its two safety buttons ensure that it never opens accidentally.

The movement is thick, measuring nearly a full centimeter from top to bottom. Its other dimensions are similarly large. We were pleased to see that this big movement amply fills its spacious case. The decision to install the barrels at an angle was most likely made for aesthetic rather than functional reasons, and only time will tell whether the drive-belt propulsion system and its ball bearings actually represent an improvement over more traditional systems. We would have liked to have seen a fine-adjustment mechanism that uses weights along the balance's rim, which would have allowed the balance spring to "breathe" freely. The fine regulation system, via an index tail and an eccentric screw, seems inappropriate for a caliber of this stature.

The decorations, however, are perfectly suited to this movement. The edges are beveled and polished; the wheels and the heads of the screws are brightly polished. Satin-finished surfaces accentuate the high-tech design. And everything is beautifully visible from the front, which means you can look at all of it while wearing the watch on your wrist.

Unfortunately, the accuracy of the Monaco V4's rate was far less impressive than its attractive finishing. TAG Heuer claims that this watch is accurate to within ± 4 seconds per day, but our test model failed to uphold those standards: with an average daily deviation of +17.8 seconds, it had obviously been adjusted too far toward the "plus" side. The greatest deviation among the various positions was 13 seconds, a figure that remained narrowly below the announced maximum value of 15 seconds.

It goes without saying that a watch that required so much time and labor for its development will be expensive, but \$80,000 is nonetheless quite a sizeable sum, especially for a brand like TAG Heuer, which is known for a much lower price range. Of course, it is impossible to predict how much this model might go up in value, especially since it is limited to 150 pieces, and there is nothing else like it — certainly nothing comparable for a lower price — on the market. ○

The clamping mechanism of the platinum folding clasp permits the wearer to freely adjust the strap's length.

